

WHAT IS CLAIMED IS:

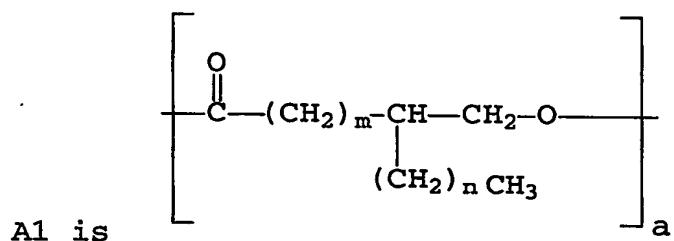
1. A vegetable oil based polyol comprised of



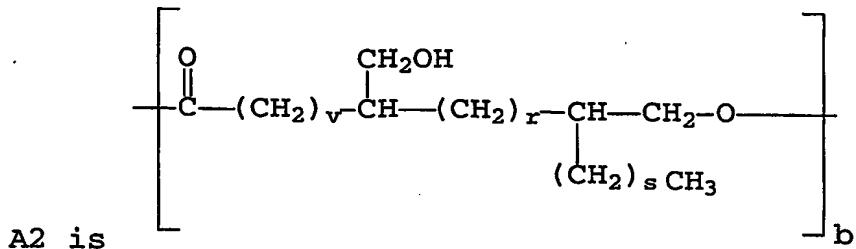
where

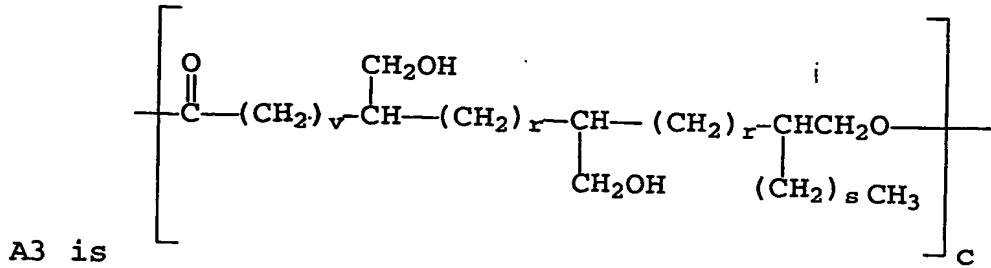
5 R is a residue of a polyol, polyamine or aminoalcohol initiator;

X and X' may be the same or different and is O, N or NH;  
 p is an integer from 1 to 5; q is an integer from 1 to 5  
 wherein p + q is from 3 to 8, t is an integer from 3 to 8 and  
 10 A may be the same or different and is selected from the group  
 consisting of A1, A2 and A3 where



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where m, n, v, r, s, a, b and c are integers and m is greater than 3, n greater than or equal to zero and m+n is from 11 to 19, v is greater than 3, r is greater than or equal to zero, 5 s is greater than or equal to zero and v+r+s is from 10 to 18, a is from 0 to 35, b is from 0 to 35 and c is from 0 to 35, so long as that all a's, b's and c's in any molecule of the vegetable oil based polyol are not all zero and (a+b+c)/(p+q+t) is about 5 to about 100 in the vegetable oil 10 based polyol.

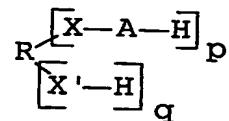
2. The vegetable oil based polyol of Claim 1 wherein at least a portion of A is A3.

3. The vegetable oil based polyol of Claim 2 wherein the amount of A3 present in the vegetable oil based 15 polyol is at least about 0.01 percent to 25 percent by weight of the vegetable oil based polyol.

4. The vegetable oil based polyol of Claim 1 wherein the initiator is of a polyol, polyamine or aminoalcohol that has a primary hydroxyl or primary amine and 20 a secondary hydroxyl or secondary amine group.

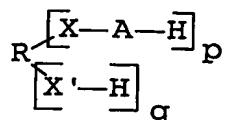
5. The vegetable oil based polyol of Claim 4 wherein the initiator has a secondary hydroxyl group.

6. The vegetable oil based polyol of Claim 4 wherein at least a portion of the vegetable oil based polyol 25 has a structure



where at least one X'-H group is a primary hydroxyl or primary amine and at least one X-A-H is located at a position corresponding to a secondary hydroxyl or secondary amine of the initiator.

7. The vegetable oil based polyol of Claim 6 wherein at least a portion of the vegetable oil based polyol has a structure:



10 where all of the X'-H groups are a primary hydroxyl or primary amine and all of the X-A-H groups are located at a position corresponding to a secondary hydroxyl or secondary amine of initiator.

15        8. The vegetable oil based polyol of Claim 7  
wherein the initiator is selected from the group consisting  
of trimethylolpropane; pentaerythritol; sorbitol; sucrose;  
glycerol; bis-3-aminopropyl methylamine; diethylene triamine;  
9(1)-hydroxymethyloctadecanol, 1,2,6-hexanetriol; any of the  
aforementioned where at least one of the alcohol or amine  
20 groups present therein has been reacted with ethylene oxide,  
propylene oxide or mixture thereof; and combination thereof.

9. The vegetable oil based polyol of Claim 1  
wherein the initiator is glycerol, pentaerythritol, sucrose,  
sorbitol, an ethoxylated glycerol, propyxylated glycerol,  
ethoxylated pentaerthritol, propyxylated glycerol or mixture  
thereof.

10. The vegetable oil based polyol of Claim 1  
wherein the initiator is glycerol or glycerol where at least

one of the alcohol groups of the glycerol has been reacted with ethylene oxide or propylene oxide.

11. The vegetable oil based polyol of Claim 10 wherein the initiator is glycerol.

5 12. A vegetable oil based polyol comprised of

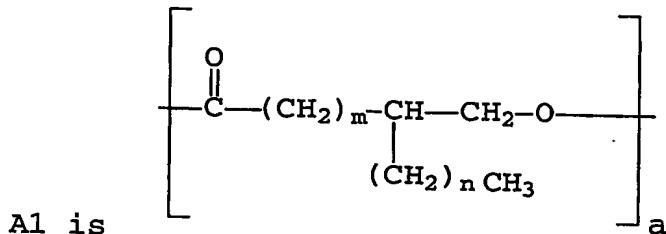


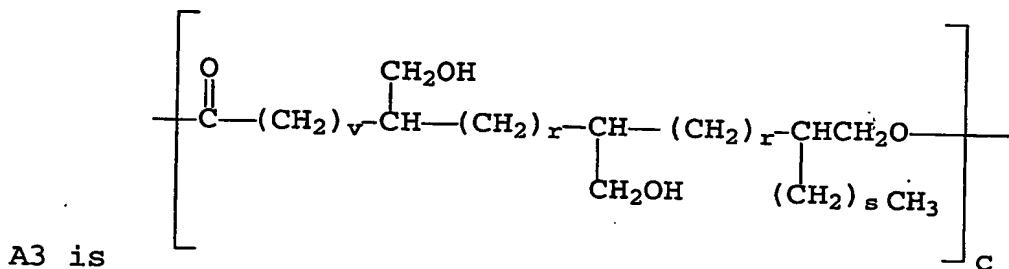
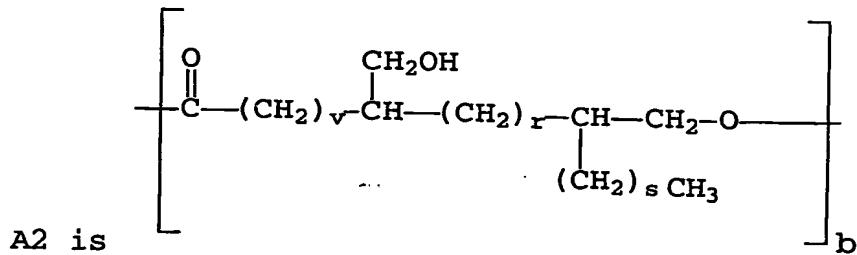
where

R is a residue of a polyol, polyamine or aminoalcohol initiator;

10 X and X' may be the same or different and is O, N or NH; p is an integer from 1 to 5; q is an integer from 1 to 5 wherein p + q is from 2 to 8, t is an integer from 2 to 8 and A may be the same or different and is selected from the group consisting of A1, A2 and A3 where

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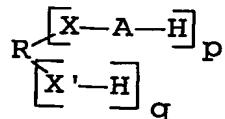
where m, n, v, r, s, a, b and c are integers and m is greater than 3, n greater than or equal to zero and m+n is from 11 to 19, v is greater than 3, r is greater than or equal to zero, s is greater than or equal to zero and v+r+s is from 10 to 18, a is from 0 to 35, b is from 0 to 35 and c is from 0 to 35, so long as that all a's, b's and c's are essentially not all zero, at least a portion of A is A3 and  $(a+b+c)/(p+q+t)$  is greater than 0 to about 100 in the vegetable oil based polyol.

13. The vegetable based oil of Claim 12 wherein  $(a+b+c)/(p+q+t)$  is about 0.5 to 50.

15 14. The vegetable based oil of Claim 13 wherein  $(a+b+c)/(p+q+t)$  is about 1 to 25.

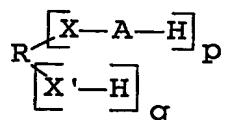
15. The vegetable based oil of Claim 12 wherein the initiator has a secondary hydroxyl group.

20 16. The vegetable oil based polyol of Claim 12 wherein at least a portion of the vegetable oil based polyol has a structure



where at least one X'-H group is a primary hydroxyl or primary amine and at least one X-A-H is located at a position corresponding to a secondary hydroxyl or secondary amine of  
5 the initiator.

17. The vegetable oil based polyol of Claim 16 wherein at least a portion of the vegetable oil based polyol has a structure:



10 where all of the X'-H groups are a primary hydroxyl or primary amine and all of the X-A-H groups are located at a position corresponding to a secondary hydroxyl or secondary amine of the initiator.

15 18. The vegetable oil based polyol of Claim 17 wherein the initiator is glycerol.

19. The vegetable oil based polyol of Claim 12 wherein the initiator is selected from the group consisting of neopentylglycol; 1,4-cyclohexane diol; 2,5-hexanediol; 1,6-hexanediol; 1,2-propylene glycol; trimethylolpropane;  
20 pentaerythritol; sorbitol; sucrose; glycerol; 1,6-hexanediol; 1,4-butanediol; ethylene glycol; diethylene glycol; triethylene glycol; bis-3-aminopropyl methylamine; ethylene diamine; diethylene triamine; 9(1)-hydroxymethyloctadecanol; 1,4-bishydroxymethylcyclohexane; 8,8-  
25 bis(hydroxymethyl)tricyclo[5.2.1.0<sup>2,6</sup>]decene; Dimerol alcohol; hydrogenated bisphenol; 9,9(10,10)- bishydroxymethyloctadecanol; 1,2,6-hexanetriol; any of the aforementioned where at least one of the alcohol or amine

groups present therein has been reacted with ethylene oxide, propylene oxide or mixture thereof; and combination thereof.

20. The vegetable oil based polyol of Claim 19 wherein the initiator is glycerol or glycerol where at least 5 one of the alcohol groups of the glycerol has been reacted with ethylene oxide or propylene oxide.

21. The vegetable oil based polyol of Claim 1 wherein vegetable based polyol is a liquid and has a weight average molecular weight of at least 350.

10 22. The vegetable oil based polyol of Claim 21 wherein the weight average molecular weight is at least about 1500.

15 23. The vegetable oil based polyol of Claim 22 wherein the weight average molecular weight is at least about 1800.

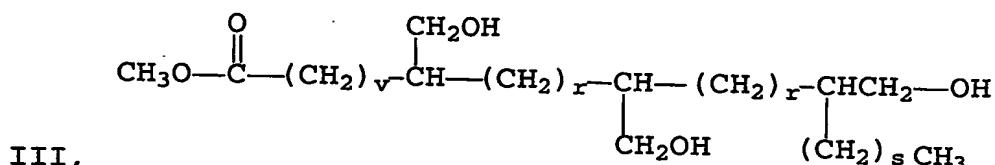
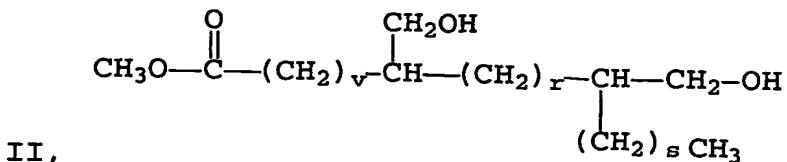
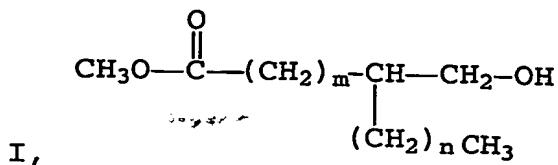
24. The vegetable oil based polyol of Claim 12 wherein vegetable based polyol is a liquid and has an average molecular weight of at least about 350 by weight.

20 25. The vegetable oil based polyol of Claim 24 wherein the average molecular weight is at least about 1500 by weight.

26. The vegetable oil based polyol of Claim 25 wherein the weight average molecular weight is at least about 1800.

25 27. A process to make a vegetable based polyol, the process comprising,

i) mixing an initiator that is a polyol, polyamine, aminoalcohol or mixture thereof, and a vegetable oil based monomer having at least one of the formulae:



where  $m$ ,  $n$ ,  $v$ ,  $r$ , and  $s$  are integers and  $m$  is greater than 3,  $n$  greater than or equal to zero and  $m+n$  is from 11 to 19,  $v$  is greater than 3,  $r$  is greater than or equal to zero,  $s$  is greater than or equal to zero and  $v+r+s$  is from 10 to 18, and

ii) heating the mixture to a reaction temperature, for a reaction time, while under a vacuum and in the presence of an amount of a catalyst sufficient to form the vegetable based polyol.

28. The process of Claim 27 wherein the catalyst is a tin catalyst and the amount of catalyst is at least about 100 parts per million by weight of the total mixture.

29. The process of Claim 28 wherein the amount of catalyst is at least about 250 parts per million.

30. The process of Claim 27 wherein the catalyst is titanium catalyst and the amount of catalyst is at least about 100 parts per million by weight.

31. The process of Claim 30 wherein the amount of catalyst is at least about 500 parts per million.

32. The process of Claim 28 wherein the catalyst is selected from the group consisting of tin (II)

5 ethylheptanoate, tin (II) octanoate, dibutylytin (IV) dilaurate and combination thereof.

33. The process of Claim 30 wherein the catalyst is titanium tetraisopropoxide, titanium tetraisobutoxide or combination thereof

10 34. The process of Claim 27 wherein the catalyst is an enzyme catalyst.

35. The process of Claim 34 wherein the catalyst is lipase.

15 36. The process of Claim 27 wherein the catalyst is comprised of a carbonate catalyst.

37. The process of Claim 36 wherein the carbonate catalyst is  $K_2CO_3$ ,  $NaHCO_3$  or combination thereof.

38. The process of Claim 27 wherein the initiator has at least one secondary hydroxyl or secondary aminogroup.

20 39. The process of Claim 27 wherein the initiator is glycerol.

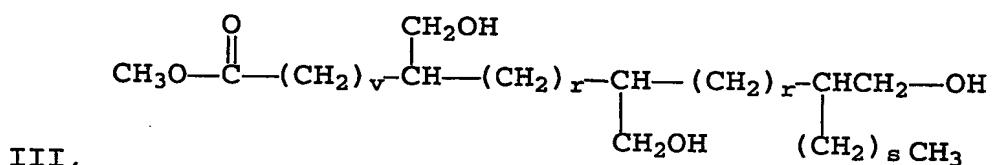
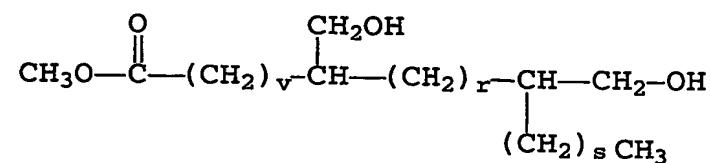
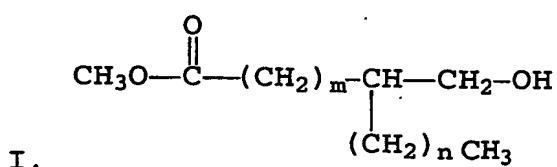
40. The process of Claim 27, wherein the initiator has volatility such that at the reaction temperature and vacuum the initiator would be in the absence of the vegetable oil based monomer substantially evaporated in at most about 25 120 minutes.

41. A polyurethane comprised of the reaction product of a polyisocyanate and the vegetable based polyol of Claim 1.

42. A polyurethane comprised of the reaction product of a polyisocyanate and the vegetable based polyol of Claim 12.

43. A process to make a vegetable based polyol,  
5 the process comprising,

i) heating, in the presence of a catalyst a vegetable oil based monomer having at least one of the formulae:



where m, n, v, r, and s are integers and m is greater than 3, n greater than or equal to zero and m+n is from 11 to 19, v is greater than 3, r is greater than or equal to zero, s is greater than or equal to zero and v+r+s is from 10 to 18 until some portion of the VOB monomers have reacted and subsequently

ii) introducing an initiator that is a polyol, polyamine, aminoalcohol or mixture thereof to the reacted VOB monomers of step (i) for a time and

temperature sufficient to form the vegetable based polyol under vacuum.

44. The process of Claim 43 wherein the initiator is volatile at the reaction conditions of step (ii).